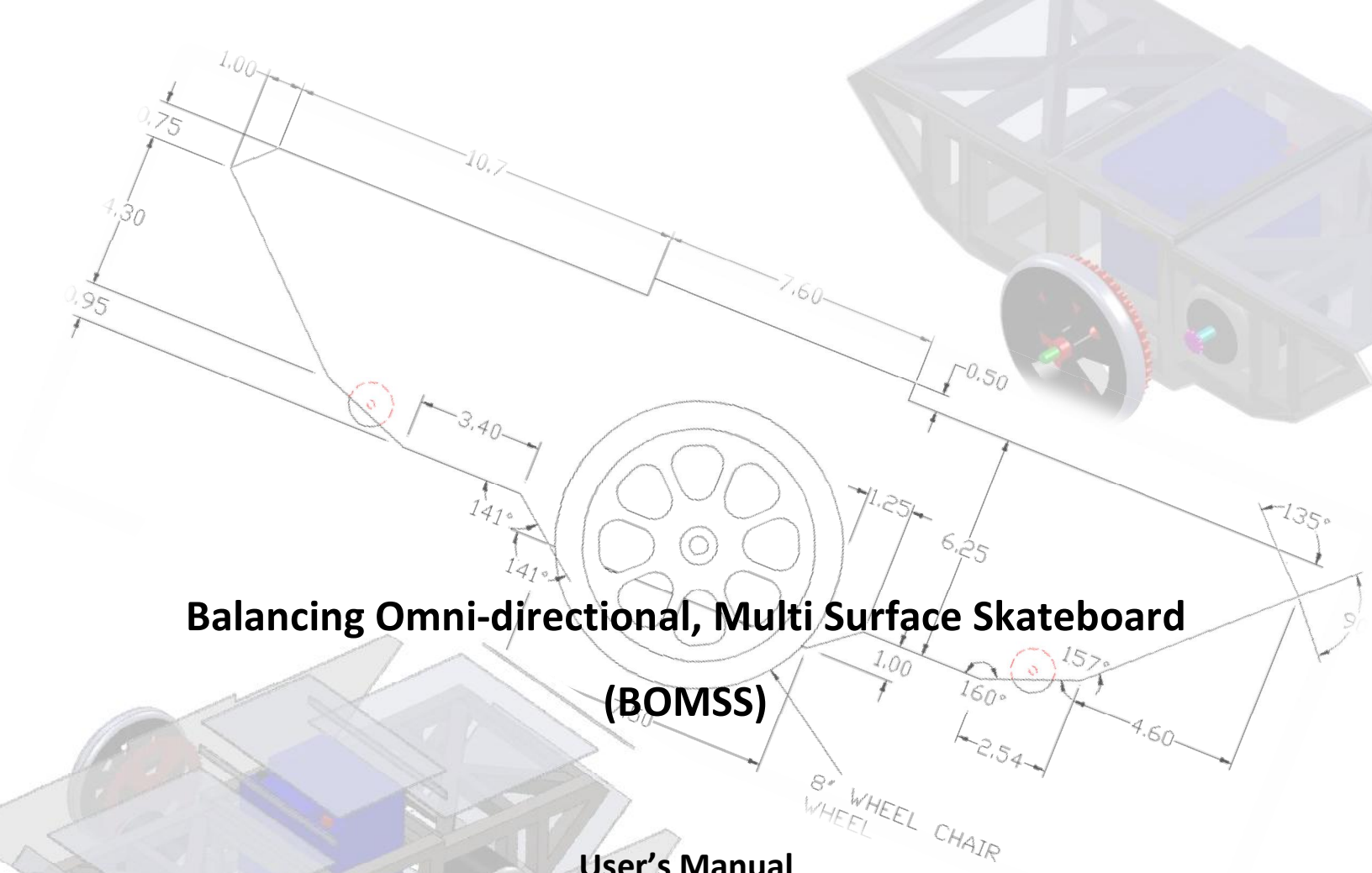
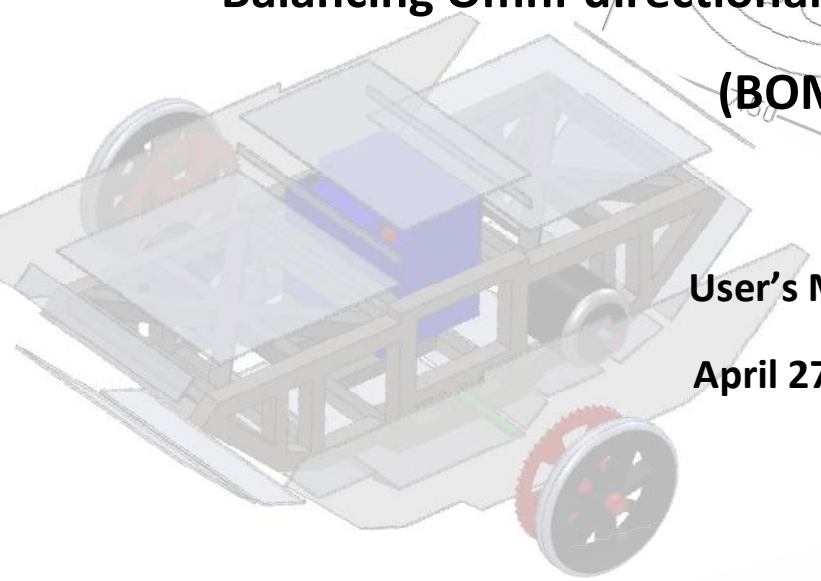
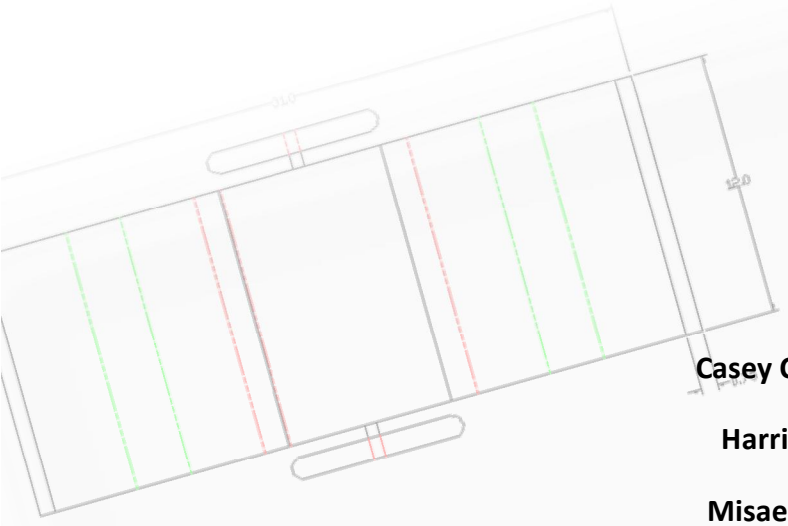


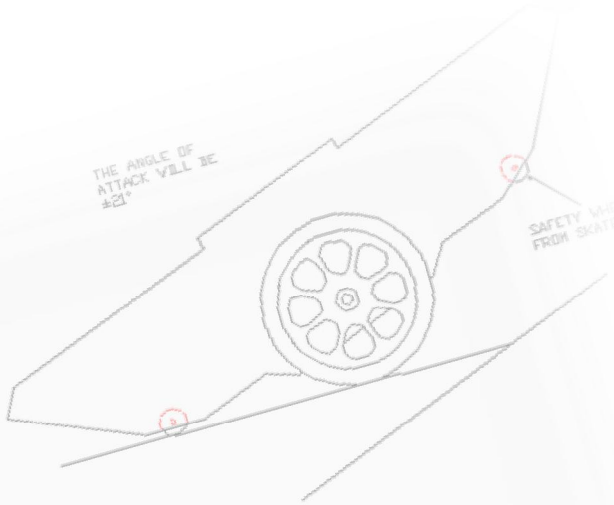
Balancing Omni-directional, Multi Surface Skateboard (BOMSS)

User's Manual

April 27, 2010



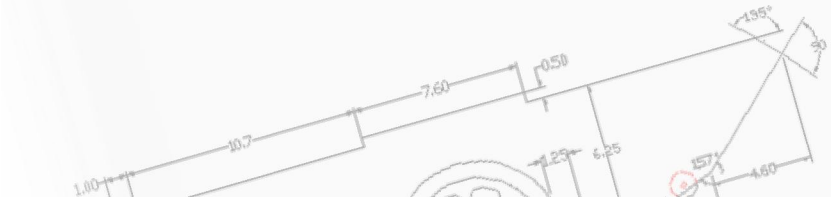


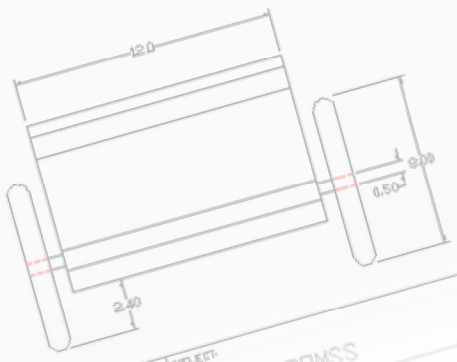


Casey Christensen

Harrison Cobb

Misael Marriaga





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Warning/Safety Disclaimer

The BOMSS's unique balancing ability and ease of use can lead you to become overconfident. If you exceed the ability of the BOMSS to balance, such as by riding over obstacles, uneven terrain, slippery surfaces, loose materials, or steep slopes, you can very quickly lose control, leading to collisions, falls, and injury. As with any other transportation device, usage of the BOMSS exposes you to risk of injury. You can reduce the risk by following all the instructions and warnings in this manual, but you cannot eliminate the risk.

- **Read this manual completely and thoroughly BEFORE operation.**
- **Do not allow any person to use your BOMSS unless that person has carefully read this manual.**

Features

- **High output power system**

  The BOMSS is equipped with a power system that can, and will, deliver speed, maneuverability, and function. The battery and motor combination provided supply ample power and ease of use for riders of all skill levels.

- **Direct drive chain system**

  By using a direct drive system, the need for a gear box is eliminated. Not having this added friction, the BOMSS is more efficient and powerful.

- **Proportional steering rate**

  Whether traveling slow or fast, the BOMSS control system allows for safe turns at any speed.

- **High luminosity blue LED indicator light**

  The BOMSS will alert the rider when the battery needs to be recharged via a brightly illuminated LED light.

- **High traction rubber wheels**

  Never doubt the traction or safety of the BOMSS. The high grip rubber wheels allow for traction and stability on any surface.

- **Over-tilt safety wheels**

  Inexperienced riders can feel at ease knowing there are safety wheels integrated into the frame that allow for over 20° of tilt during acceleration and operation!

- **Vibration resistant components**

  Any surface can be traversed with your new vehicle. Vibration resistant components are installed to eliminate the frustration and danger of a loose wire. Simply allow the vehicle to safely and reliably take you where you please.

- **NEW design considers operability, maneuverability, and weight balance**

  A new frame design for the BOMSS balances without even being turned on! This exact weight distribution and uniformity allow for a consistently stable platform for the rider.

- **Water resistant outer shell**

  70% of the Earth is covered in water, why limit yourself? The design of the BOMSS allows for use in almost any condition. The water resistant nature of the shell allows for the rider to go through the puddle, not around it.

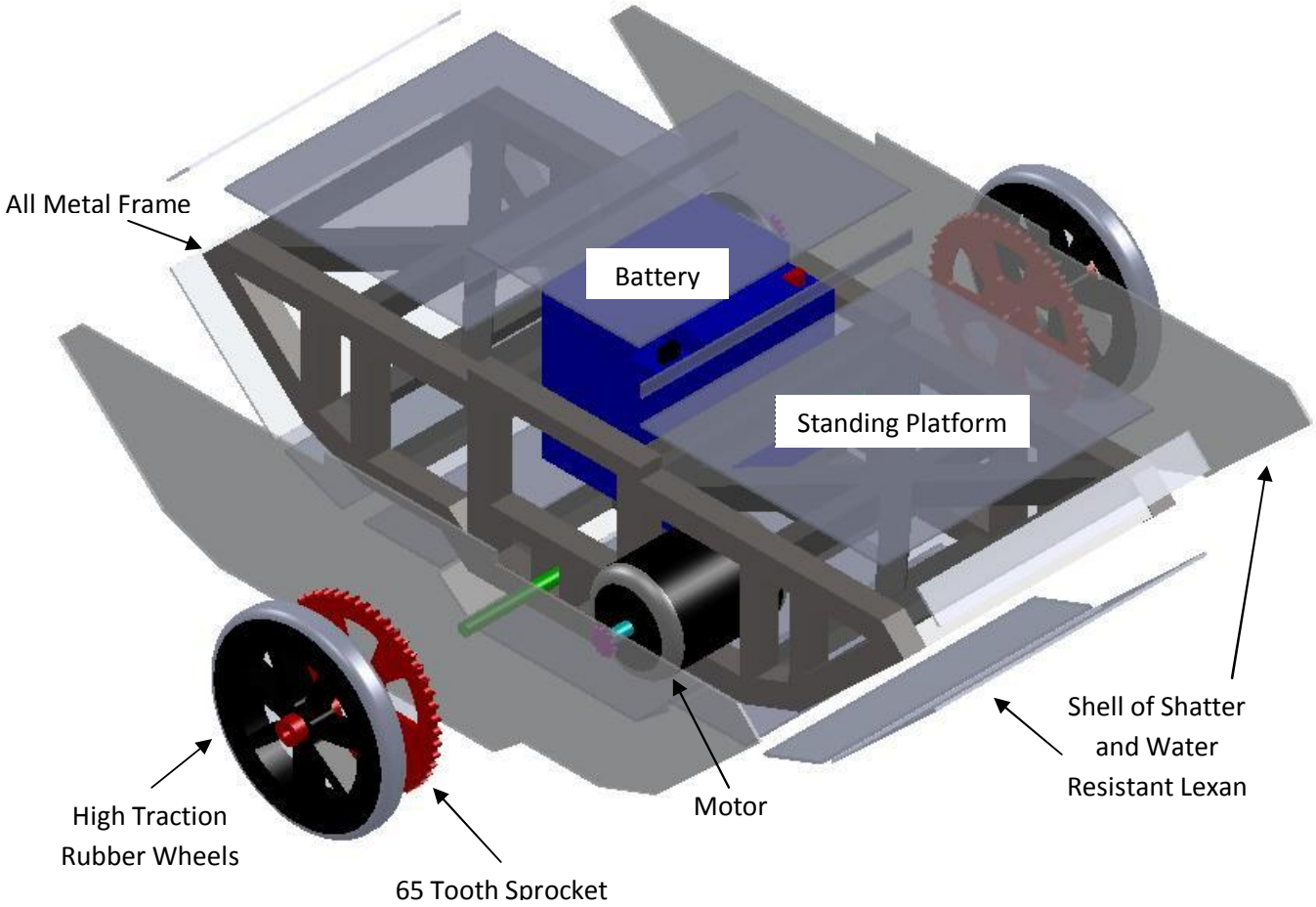
- **Ease of access panels**

  Need to access the inside for maintenance? No problem. Remove a few screws and you're in! No special tools required.

- **Extended runtime**

  24 V 20 Ah battery allows for over 1 hour of runtime!

Key Components



Using the BOMSS Vehicle

Initial Setup

⚠ Caution - Risk of Injury

Whenever you ride the BOMSS, you risk injury from loss of control, collisions, and falls. It is your responsibility to learn how to safely ride the BOMSS in order to reduce this risk. This manual is designed to help you learn safe riding techniques.

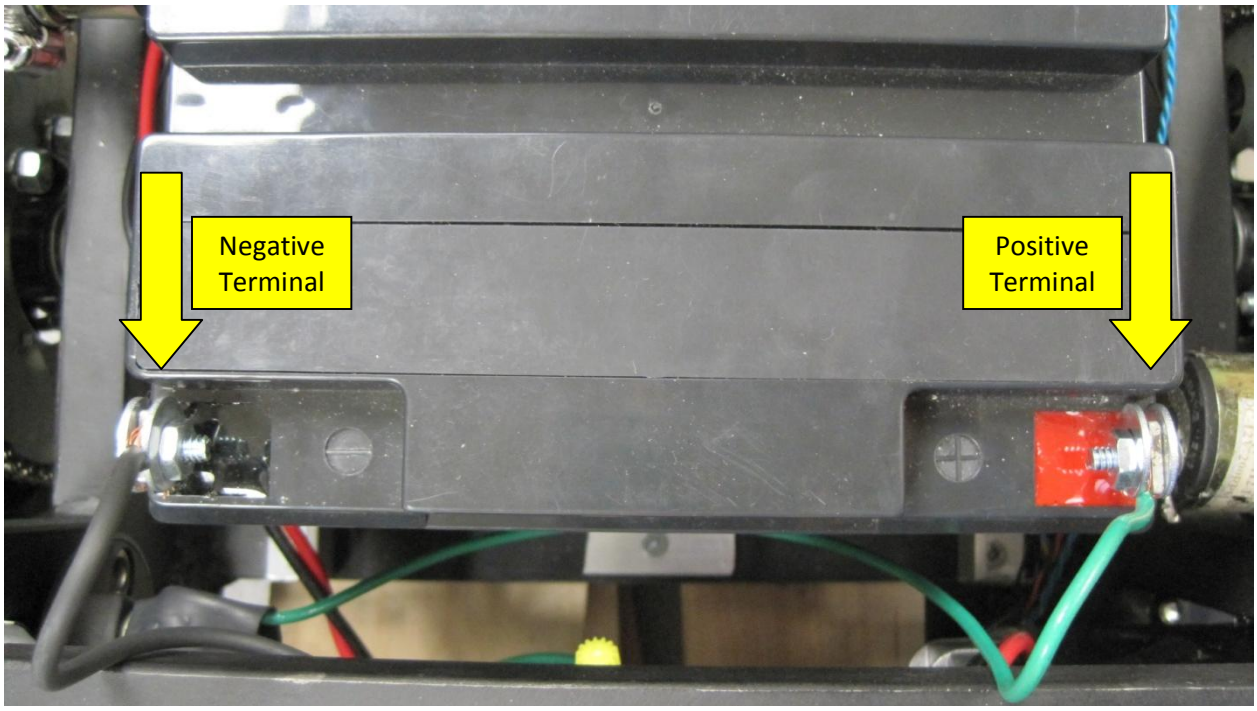
Once you have removed the BOMSS system from its packaging and ensured that all parts are accounted for, only a few steps remain before it can be used.

The BOMSS comes almost fully assembled, requiring only the addition of a compatible battery (refer to page 21 for details) and the attachment of the top battery compartment cover using the included screws.

⚠ Caution

ALWAYS be certain that the polarity of the battery is correct when attaching the cables. The **GREEN** cable is to be connected to the **POSITIVE (+)** side of the battery, and the **BLACK** cable must be connected to the **NEGATIVE (-)** side of the battery. Ensure that neither one of the cables comes into contact with the metal frame while the other is connected to the battery. This can cause a short circuit, possibly causing harm to the user.

Failure to connect the battery properly could cause harm to the user or circuitry contained inside the BOMSS, voiding the warranty.



Once you have selected and purchased an adequate battery, install it into the frame between the metal feet. Position is important! Once the battery is in place, attach the battery lead cables, black and green, to the battery using the supplied eyelets and wing nuts.

Charge the battery per the manufacture's specifications. Once the battery is properly charged, attach the top battery compartment cover using the four (4) provided machine screws and a Philips head screwdriver. It is suggested that you read the entire manual thoroughly before any attempt to ride the vehicle.

Rider Posture

When operating the BOMSS, it is essential that you are not “stiff” and unable to react with the changes in terrain.

- Keep your legs bent to allow for even weight distribution
- Keep eyes forward
- Anticipate obstacles and, when unavoidable, bend legs and move body to “soak-up” any bumps
- Keep arms extended at shoulder height for balance
- Keep body centered over the center of the vehicle at all times
- Lean slightly to the INSIDE of the turn you are making for balance and stability

Rider Etiquette

Use proper etiquette when riding your BOMSS vehicle.

- Be careful and considerate of others.
- Always ride under control and at a speed that is safe for you and those around you.
- Always be prepared to stop.
- Respect pedestrians by always yielding the right of way.
- Avoid startling pedestrians. When approaching from behind, announce yourself and slow down to walking speed when passing. Pass on the left whenever possible. When approaching a pedestrian from the front, stay to the right and slow down.
- In heavy pedestrian traffic, slow down and proceed at the pace of pedestrian traffic. Pass only if there is ample space to do so safely. Do not weave in and out of pedestrian traffic. When riding with other BOMSS riders, maintain a safe distance, identify hazards and obstacles, and do not ride side-by-side unless there is plenty of room left for pedestrians.
- Do not park your BOMSS in a way that blocks pedestrian traffic.
- Cross roads at designated crosswalks or signaled intersections. Do not jaywalk/ride.
- Do not operate your BOMSS on a public roadway.
- Do not ride your BOMSS on private property (inside or outside) unless you have obtained permission to do so.
- Obey applicable laws and regulations.

If you do not wish to comply with any of the above criteria, do not operate the BOMSS. Please return the unused vehicle to the place of purchase for a full refund.

First Ride

Step 1: Preparing for Your Ride

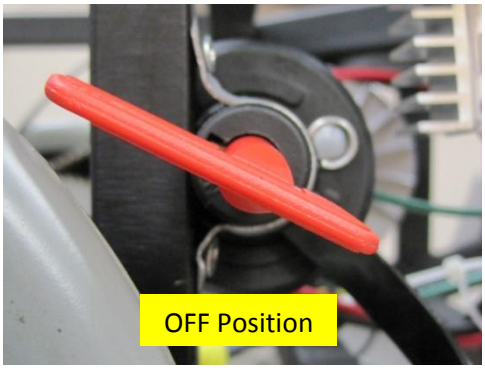
1. Select an appropriate area for your first ride. This area should be outdoors and should measure at least 12 feet by 12 feet (4 meters by 4 meters). It must have a level, smooth riding surface with good traction and should be free of obstructions and away from vehicles, bicycles, pets, small children, and other distractions.

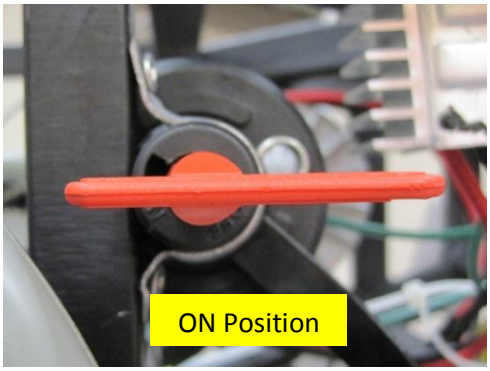
2. You may need a helper who has studied all the instructions and warnings in this manual to assist you.

3. Always wear a helmet suitable for biking, skateboarding, or rollerblading (not included). Wear the helmet in accordance with the helmet manufacturer's instructions.

Step 2: Powering On the BOMSS

1. Using the red key, power on your BOMSS by turning the power switch to the ON position. The power switch is located on the left-hand side of the vehicle.





⚠ Caution

Do not step onto the BOMSS yet! Your BOMSS is powered on, but it is not balancing.

Step 3: Before Stepping On

Your BOMSS is on, but it is not able to balance yet. There is a weight sensing device installed on the BOMSS to prevent operation until it senses the weight of an appropriately sized rider. Therefore, even though the main power switch is on, the vehicle will not balance until mounted. To ensure that the BOMSS is on but not operational:

1. Locate the blue LED battery level indication light. The light should be lit.

2. WITHOUT MOUNTING THE VEHICLE, tilt the BOMSS up to a level position using only your hands. The BOMSS should not balance on its own.

3. If the skateboard does begin to balance, turn off the main power switch immediately and discontinue use until the problem is resolved.

Step 4: Stepping On

Remember, the BOMSS will move forward, backward, or turn if you rock on the standing platform. Avoid leaning from side to side as you step on. To eliminate undesired movement, holding onto a railing or being assisted by another person while learning the correct mounting technique is recommended.

1. Place one foot on one platform, distributing your full weight to it.

2. Bring your other foot up and when it comes into contact with the other foot platform, lean forward towards the front of the vehicle, shifting your weight forward of center.

3. Once the BOMSS platform begins to level, the control system will initiate and begin to balance the vehicle. At this point the vehicle will respond to all movements made.

Step 5: Moving the BOMSS Forward and Backward

The BOMSS moves forward and backward in response to changes in your position.

1. With your helper available to assist you, slowly lean forward and feel the BOMSS move forward. Then stop leaning forward and feel it slow down and stop. Do this a few times.

2. Look behind you and then slowly lean back and feel the BOMSS move backward. Then stop leaning back and feel it slow down and stop. Do this a few times.

3. With your helper standing close by, practice going forward and backward a short distance in each direction.

Step 6: Stopping

Stop the BOMSS by shifting your weight away from the direction you are moving.

To stop the BOMSS:

1. When you are moving forward, gently shift your weight back past the center of the vehicle.

2. Once stopped, center your weight over the center to remain stationary. If you continue to lean back, you will move backward.

3. Practice choosing a spot on the ground, and coming to a smooth controlled stop at that spot. Then remain stationary.

Step 7: Turning the BOMSS

The BOMSS turns in the direction that you lean. You turn the BOMSS by leaning to the left or right. The figure below illustrates how to turn in each direction.

Turning towards toe Turning towards heel

First, practice turning in place. To turn in place, slowly shift your body weight, while remaining centered, to one side in the direction that you want to turn. The BOMSS will rotate so that you turn in place. Practice turning to the right and to the left using this technique.

After you are comfortable going forward, backward, and turning in place, try slowly riding forward and turning at the same time. Keep your knees slightly bent and lean in the direction of the turn. Because abrupt turns can be dangerous, always lean into turns slowly and smoothly. Notice how the BOMSS turns more sharply as you lean more into the turn.

Step 8: Stepping Off

When you are ready to step off the BOMSS for the first time, your helper should assist you.

1. Remain stationary by keeping your weight centered over the wheels and standing platforms.

2. By lifting one foot, remove your weight from the platform designated by grip tape in the shape of 'F'. A picture of the front platform is shown.

The motors will immediately power off and a controlled dismount can be achieved.

Step 9: Securing Your BOMSS

The BOMSS provides a security function in case you need to leave your BOMSS unattended. Simply remove the vehicle specific key from the power switch and the BOMSS is useless. The best way to discourage tampering with your BOMSS is to keep it in a secure indoor location with the main power key stored separately. The security function is intended for use when you remain in the general area of the BOMSS. If you must leave your BOMSS unattended in a location that is not secure, remove the main power key and you may use a lock to secure the vehicle to a stationary object.

Maintenance/Periodic Check-Ups

The BOMSS requires no special maintenance or periodic check-ups. However, to prolong the use of your skateboard, the following things are recommended.

1. **Thoroughly check the riding platform** for any misalignment or twisting of the frame. The frame should be stiff and straight, with no flexing motion to the sides. The axles should be straight and free of rust and debris. If there is debris present on the axles, discontinue use until the axles have been cleared.
   **Inadequate cleaning of the axles can result in warping or failure. Occasional clearing of the axles is required; failure to do so can result in loss of warranty.

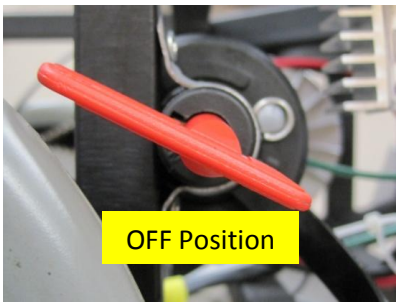
2. **Visually inspect the drive chain and sprocket on each wheel.** The sprockets should be properly aligned and ride parallel to the frame. The chain should run smoothly over the motor gears and wheel gear without any grabbing or slackening of the chain. The chain should be lightly lubricated with small engine oil to prevent binding of the teeth and sockets. There should be no visible chips or bends in the chain and sprocket. If any of the parts show signs of visual fatigue discontinue use until the skateboard has been inspected by a certified repairman.

3. **Visually inspect the wiring** through the Lexan covering. If any wires appear to be loose or disconnected, immediately remove power from the skateboard and take your BOMSS to a certified repair store for rewiring.

Battery Charging

After approximately one (1) hour, or sixty (60) minutes of riding, the battery you purchased will likely need to be recharged. The following steps should be taken in recharging a Sealed Lead-Acid battery (SLA).

Step 1: Turn off the main power switch



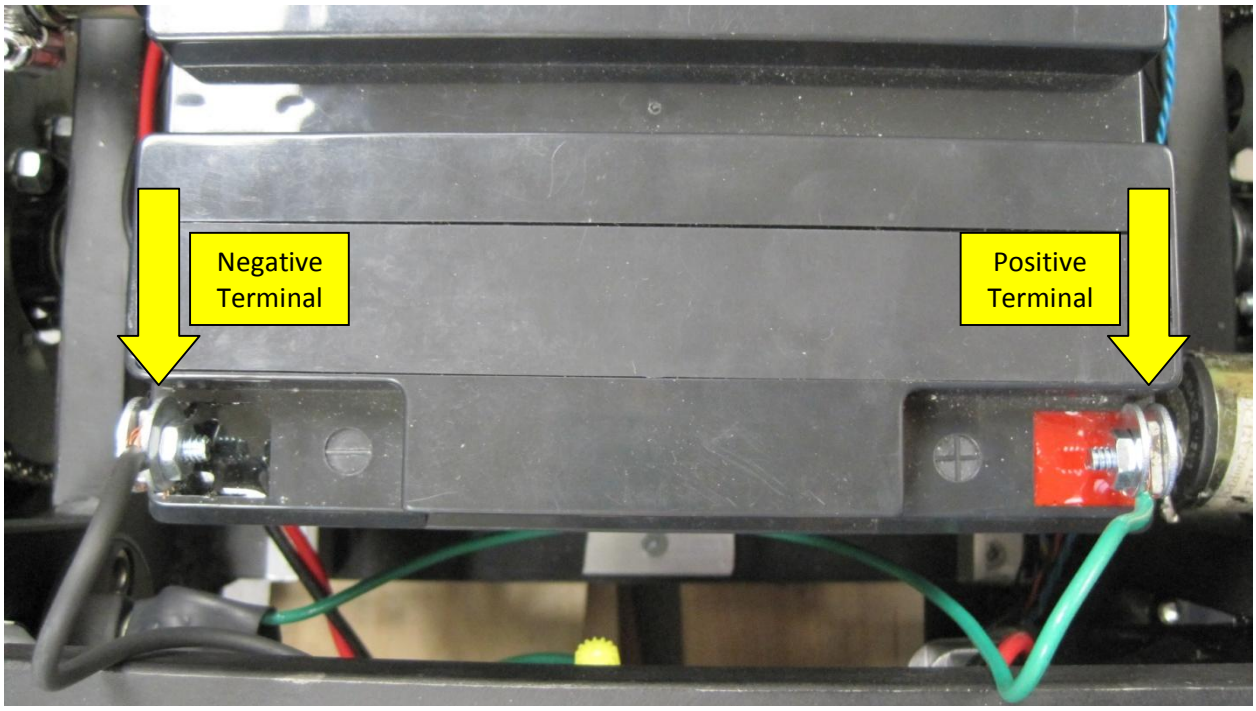
1. Turn the red key on the left hand side of the skateboard to OFF
2. Remove the red key.
3. Power is now completely disconnected from the device, allowing for safe handling of the battery.

Step 2: Remove the Lexan covering from the battery compartment

1. Using a Philips head screwdriver, turn the screws holding the battery compartment cover CCW to remove them from the platform.
2. Remove the sheet of Lexan covering the battery to allow for easy access to the battery compartment.

Step 3: Remove the wires connected to the red and black terminals of the battery

1. Remove the green wire connected to the positive battery terminal.
2. Remove the black wire connected to the negative battery terminal.
3. The battery can now be handled freely. Be careful not to cross the green and black wires while they are attached to the battery. Doing so can cause irreparable damage to the skateboard and void the warranty.



Step 4: Attach the battery charger according to the instructions provided with the charger

1. Using the instructions provided with your battery charger, attach the charger to the battery and allow it to charge for the allotted amount of time.
2. After charging is complete, replace the wires to the proper battery terminals before recovering the battery compartment with the provided Lexan covering.

Storage

If storing the BOMSS device for a period longer than two (2) days, follow the appropriate steps to remove the battery wiring for charging. After removing the green and black wires, remove the battery from the device. The battery should be stored at room temperature (75°) with a full charge.

Failure to remove the battery while storing the device for prolonged periods will void the warranty and may cause damage to the electrical system.

Safety Precautions

The BOMSS's unique balancing ability and ease of use can lead you to become overconfident. If you exceed the ability of the BOMSS to balance, such as by riding over obstacles, uneven terrain, slippery surfaces, loose materials, or steep slopes, you can very quickly lose control, leading to collisions, falls, and injury. As with any other transportation device, usage of the BOMSS exposes you to risk of injury. You can reduce the risk by following all the instructions and warnings in this manual, but you cannot eliminate the risk.

- **Read this manual completely and thoroughly BEFORE operation.**
- **Do not allow any person to use your BOMSS unless that person has carefully read this manual.**

Operation Precautions

Caution

BOMSS is only intended for users over the age of 16. Users under the age of 16 are strongly advised to be accompanied by an adult.

NEVER operate the vehicle on any public streets or highways.

Read all instructions and precautions before operating the vehicle.

Do not operate the vehicle if the LED voltage indicator is dim. This indicates that the battery is almost dead. Operating the vehicle while the LED indicator is dim can cause the battery's lifespan to be shortened.

If the BOMSS does not perform as desired, discontinue use immediately and take the vehicle to a repair center.

If at any time you become uncomfortable or unstable while riding the BOMSS, discontinue use immediately until you are once again comfortable with its operation.

NEVER allow more than one adult to ride the vehicle at any given time. The BOMSS was designed for one rider at a time only. The BOMSS will not operate correctly with more than one person and injury could occur.

ALWAYS wear a helmet suitable for biking, skateboarding, or rollerblading (not included). Wear the helmet in accordance with the helmet manufacturer's instructions.

Battery Handling Precautions

⚠ Caution

ALWAYS use approved 24 Volt (V) SLA batteries with the BOMSS. Use of other types of batteries can cause unexpected behavior of the system, possibly causing injury to the user. The BOMSS power system was designed to operate using a SLA battery only. The battery must not exceed dimensions of 7.13" L x 5.87" W x 6.57" H or the specified 24 V.

When the BOMSS is not going to be in use for a prolonged period of time, more than 2 days, disconnect the battery cables to eliminate discharge of the battery over time. Battery may experience self-discharge even when disconnected and may require charging prior to use.

NEVER connect the two leads of any battery (positive and negative) to each other.

NEVER discharge a SLA battery completely to dead. Doing so will damage the battery.

ALWAYS charge a battery as directed by original manufacture. Failure to follow those steps could significantly shorten the lifespan of the battery, or cause the battery to become unsafe.

SLA batteries contain caustic acids. NEVER dismantle a SLA battery. If the acid comes into contact with your skin, wash the area thoroughly. If ingested, contact a poison control center immediately. Do not induce vomiting.

Do not leave the battery on its side for longer than one hour. The battery, and BOMSS, must be left on its wheels when not in use to avoid battery leakage.

When charging the battery, use an approved battery charger specific to your battery model. Do not use chargers that are not designed for your battery.

Storage and Disposal Precautions

Caution

When the BOMSS is not in use for more than 2 days, disconnect the battery leads from the battery and store the entire unit on its wheels on a flat surface.

NEVER set the BOMSS on its side resting on one of the main drive wheels. This can cause the wheel to flex and become misaligned or to possibly break.

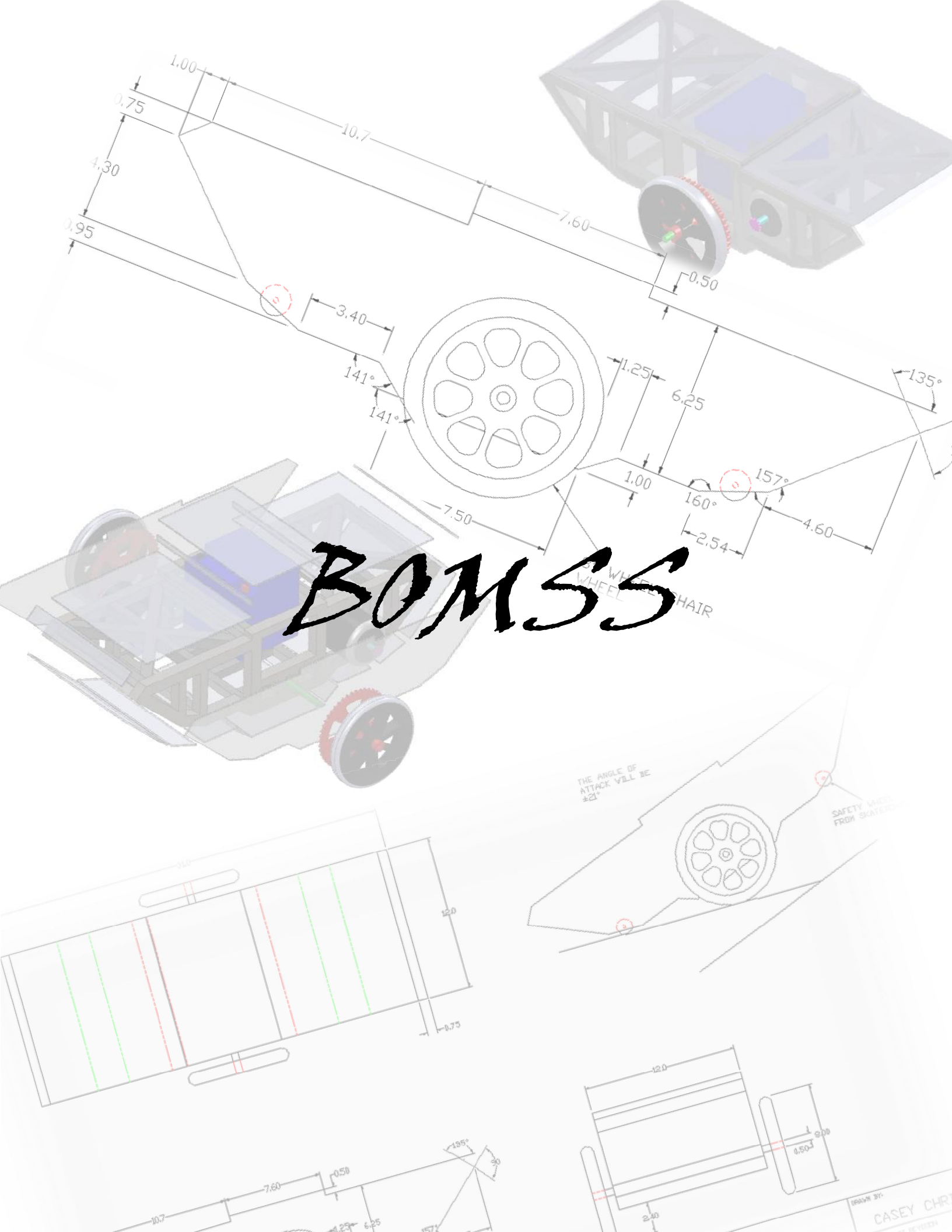
NEVER lean the BOMSS against a wall in an upright position when the battery is in place. This can cause battery leakage.

If the battery, at any time, begins to leak or discharge a fluid, discontinue use IMMEDIATELY and dispose of the battery per manufacture's suggestions.

If stored for a prolonged period of time, the battery may discharge slowly. Charge the battery properly before use after storage.

Troubleshooting

Problem	Cause	Solution
BOMSS won't turn on	Key not turned to "ON" position	Turn key ON
	Battery discharged below limit	Charge battery with approved charging device
	Cables from frame not connected to battery	Connect cables as described on pages 7 and 8
Battery will not charge	Battery was over discharged	Dispose of battery properly and purchase a new one
	Battery lifespan has been reached	
	Charger is not properly connected	Check all connections between battery, charger, and wall socket
	Charger is faulty	Check to see if charger is plugged in. If so and problem persists, purchase new charger
BOMSS turns on, but does not balance or move	Faulty control system	Contact manufacturer for further troubleshooting
BOMSS is unstable at high speeds	Wheels are out of balance	Check for a broken or deformed wheel
	Chain is loose causing lag in control	Check for slop in chain and replace or contact manufacturer for tensioning assistance
	Operating on slippery surfaces	Move to an area with smooth, dry surfaces
	You're going too fast	Slow down. Ride within your ability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BOMSS
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